Catalogue no.82-624-X
ISSN 1925-6493

Health at a Glance

Trends in the incidence and mortality of female reproductive system cancers

by Tanya Navaneelan

Release date: February 17, 2015

Statistics Canada Statistique Canada

Canada

How to obtain more information

For information about this product or the wide range of services and data available from Statistics Canada, visit our website, www.statcan.gc.ca.

You can also contact us by

email at infostats@statcan.gc.ca

telephone, from Monday to Friday, 8:30 a.m. to 4:30 p.m., at the following toll-free numbers:

- Statistical Information Service 1-800-263-1136
- National telecommunications device for the hearing impaired 1-800-363-7629
- Fax line 1-877-287-4369

Depository Services Program

- Inquiries line 1-800-635-7943
- Fax line 1-800-565-7757

Standards of service to the public

Statistics Canada is committed to serving its clients in a prompt, reliable and courteous manner. To this end, Statistics Canada has developed standards of service that its employees observe. To obtain a copy of these service standards, please contact Statistics Canada toll-free at 1-800-263-1136. The service standards are also published on www.statcan.gc.ca under "About us" > "The agency" > "Providing services to Canadians."

Note of appreciation

Canada owes the success of its statistical system to a long-standing partnership between Statistics Canada, the citizens of Canada, its businesses, governments and other institutions. Accurate and timely statistical information could not be produced without their continued co-operation and goodwill.

Standard table symbols

The following symbols are used in Statistics Canada publications:

.	not available for any reference period
..	not available for a specific reference period
...	not applicable
0	true zero or a value rounded to zero
0[s]	value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
[p]	preliminary
[r]	revised
x	suppressed to meet the confidentiality requirements of the *Statistics Act*
[E]	use with caution
F	too unreliable to be published
*	significantly different from reference category ($p < 0.05$)

Published by authority of the Minister responsible for Statistics Canada

© Minister of Industry, 2015

All rights reserved. Use of this publication is governed by the Statistics Canada Open Licence Agreement.

An HTML version **is also available.**

Cette publication est aussi disponible en français.

Health at a Glance

Trends in the incidence and mortality of female reproductive system cancers

by Tanya Navaneelan

Highlights

- Uterine cancer was the most commonly diagnosed reproductive system cancer in 2010, with a rate of 30.3 new cases per 100,000 women. Uterine cancer incidence was at its highest rate since 1992.
- The risk of a woman being diagnosed with uterine cancer in her lifetime was 1 in 36.
- Ovarian cancer was the deadliest reproductive system cancer, causing 9.5 deaths per 100,000 women in 2010.
- Cervical cancer was more likely to affect younger women than uterine or ovarian cancer. The median age of diagnosis with cervical cancer was 47 years and 28.7% of all new cases were in women under the age of 40.
- The greatest decreases in death from cervical cancer have been made among older women, resulting in a decrease in the median age of death.

There were 82,885 new cases of cancer in Canadian women in 2010. Reproductive system cancers accounted for 12.0% of these new cases. The most common types of female reproductive system cancers were cancers of the uterus, ovary and cervix — 9 out of 10 cases developed in one of these three sites (Table 1).

This article presents incidence (new cases) and mortality (deaths) data on uterine, ovarian and cervical cancers. The main data sources are the **Canadian Cancer Registry (CCR)** and the **Canadian Vital Statistics – Death Database**.

Table 1
Incidence of female reproductive system cancers, Canada, 2010

Cancer	New cases	Incidence rate (per 100,000 women)	Percent of all new cancers in women
All reproductive system	9,957	58.0	12.0
Uterus	5,191	30.3	6.3
Uterus, specified	5,044	29.4	6.1
Uterus, NOS[1]	147	0.8	0.2
Ovary	2,465	14.4	6.6
Cervix	1,390	8.1	1.7
Vagina	127	0.7	0.2
Vulva	487	2.8	0.6
Other gynecological cancers	297	17.3	0.4

1. NOS = not otherwise specified

Source: Canadian Cancer Registry, Statistics Canada.

Uterine cancer incidence at its highest level since 1992; ovarian and cervical cancer incidence decreasing

In 2010, uterine cancer was the most commonly diagnosed female reproductive system cancer in Canada, with an incidence rate of 30.3 new cases per 100,000 women (Table 2). Between 1992 and 2005 there was no significant change in the rate of uterine cancer; however between 2005 and 2010 there was an increase of 2.5% per year.[1,2] This increase resulted in uterine cancer hitting its highest level since 1992, the earliest year captured in the CCR (Chart 1).

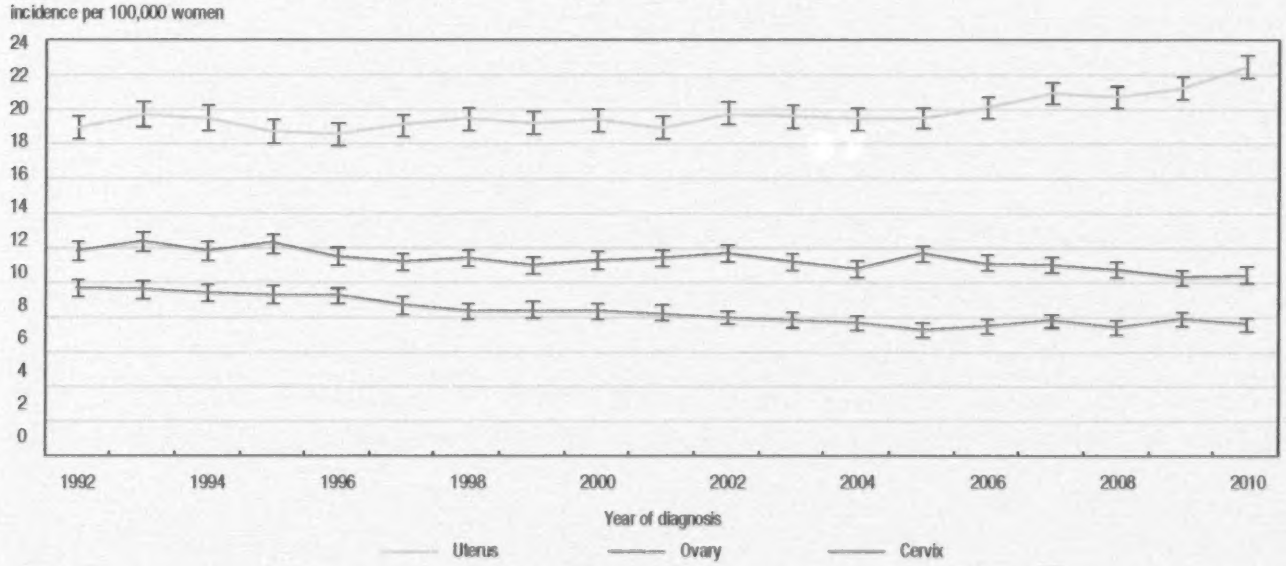
Ovarian cancer was the second most commonly diagnosed reproductive system cancer. The rate of ovarian cancer was 14.4 new cases per 100,000 women (Table 2). Between 1992 and 2010 the rate of ovarian cancer decreased by 0.8% annually (Chart 1).

Table 2
Incidence and mortality summary statistics, Canada, 2010

	Incidence		
Type of cancer	New cases	Rate per 100,000 women	Median age at diagnosis
Uterus	5,191	30.3	62
Ovary	2,465	14.4	62
Cervix	1,390	8.1	47
	Mortality		
Type of cancer	Deaths	Rate per 100,000 women	Median age at death
Uterus	919	5.4	72
Ovary	1,637	9.5	72
Cervix	372	2.2	59

Source: Canadian Cancer Registry, Statistics Canada; Vital Statistics – Death Database, Statistics Canada.

Chart 1
Incidence rate, by type of cancer and year, age-standardized, Canada, 1992 to 2010



Note: The vertical error bars overlaid on the trend lines indicate the 95% confidence intervals. Confidence intervals indicate the degree of variability in the estimate and enable more valid comparisons of differences between estimates.

Source: Canadian Cancer Registry, Statistics Canada.

Cervical cancer was the third most commonly diagnosed reproductive system cancer with a rate of 8.1 new cases per 100,000 women (Table 2). Like ovarian cancer, the incidence of cervical cancer has declined over time, falling by 2.1% annually between 1992 and 2005. However, this decrease has leveled off in recent years and, between 2005 and 2010, there was no significant change in the rate (Chart 1).

Research into the decline in the rate of cervical cancer indicates that this is most likely the result of cervical cancer screening programs.[3,4,5] These programs have helped to increase the number of pre-cancerous conditions caught before they develop into invasive cancer.

Cervical cancer screening

Unlike uterine and ovarian cancer, cervical cancer has a widely available screening test: the Papanicolaou (Pap) test. Most cervical cancer occurs in women who have never undergone screening or who have had a long interval between Pap tests.[6] In 2012, 90.2% of women aged 21 to 69 reported having had a Pap test in their lifetime, although only 74.2% had one within the past three years, as recommended. In addition, the percentage of women who had a Pap test within the past three years decreased over time, down from 77.5% in 2000.[7]

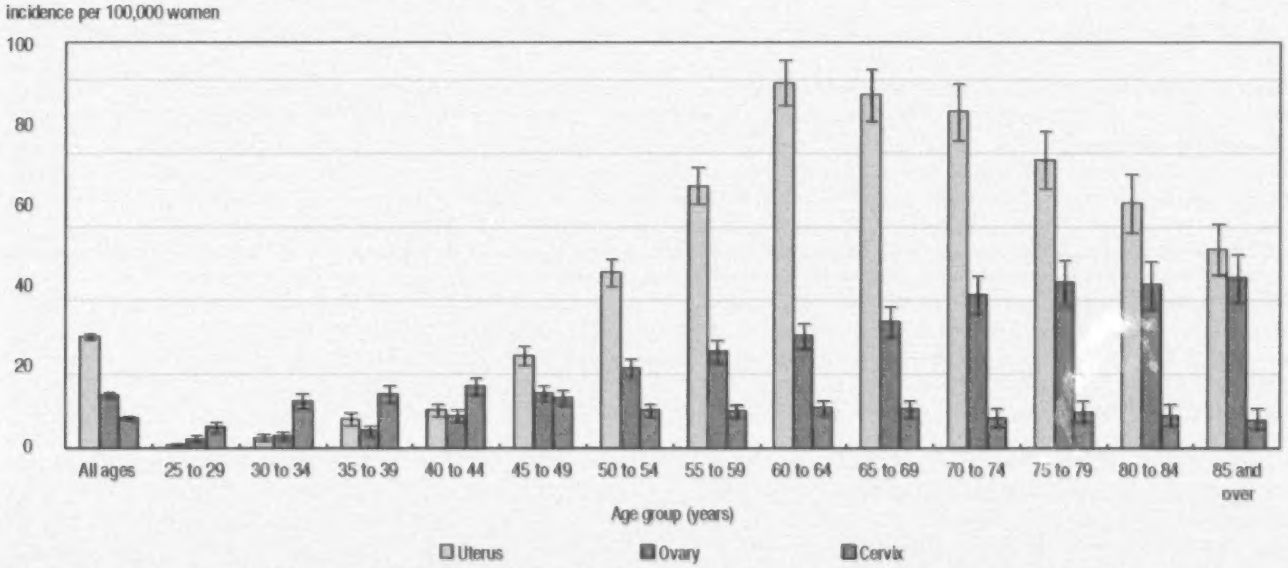
Ovarian cancer risk increases with age; uterine and cervical cancer risk rises and falls over the life span

A woman's age can affect her risk of developing each type of reproductive system cancer. Women in their sixties and early seventies had the highest risk of uterine cancer (Chart 2). The peak was in women between the ages of 60 to 64, who had a rate of 99.0 new cases per 100,000 women. Around this peak, incidence rates increased with age for women aged 25 to 59 while they decreased with age for women 65 and older.

Over time, the highest levels of uterine cancer risk have shifted to younger women. In 2010, the median[8] age of diagnosis with uterine cancer was 62 years. In contrast, in 1992, the median age of diagnosis was 66 years and women in their seventies had the highest incidence rate.

Unlike uterine cancer, ovarian cancer rates tended to increase with age. Ovarian cancer was relatively rare in women aged 25 to 29, who had a rate of 2.4 new cases per 100,000. In comparison, incidence was more than 20 times higher in women aged 85 and older who had a rate of 46.1 new cases per 100,000 women (Chart 2). Although risk increased with age, 6.4% of ovarian cancer cases were diagnosed in women under the age of 40 compared with 2.6% of uterine cancer cases. Similar to uterine cancer, the median age of diagnosis with ovarian cancer was 62 years.

Chart 2
Age-specific incidence rate, by type of cancer and age group, Canada, 2010



Note: Cases in younger age groups have been suppressed due to the small number of cases (n<5).
The vertical error bars overlaid on the bars indicate the 95% confidence intervals. Confidence intervals indicate the degree of variability in the estimate and enable more valid comparisons of differences between estimates.
Source: Canadian Cancer Registry, Statistics Canada.

Women in their early forties had the highest risk of cervical cancer. Women aged 40 to 44 had a cervical cancer incidence rate of 16.6 new cases per 100,000 women. Similar to uterine cancer, rates were lower on either side of this peak, although the risk was more evenly distributed across the age groups (Chart 2).

Compared with the other two main reproductive cancers, cervical cancer was more likely to affect younger women with 28.7% of cases occurring in women under the age of 40. Despite cervical cancer having the lowest overall incidence, women aged 25 to 45 had a higher rate of cervical cancer than of uterine or ovarian cancer. Additionally, the median age at which women were diagnosed with cervical cancer was 47 years, considerably lower than for the other two cancers.

Lifetime risk

Lifetime risk estimates the risk of a newborn child developing a particular type of cancer at some point during their lifetime.[9,10] The lifetime risk of developing uterine cancer was 1 in 36 (or 2.8%) in 2010.[11] Ovarian cancer had a lower lifetime risk of 1 in 71 (or 1.4%), and cervical cancer had the lowest lifetime risk of 1 in 155 (or 0.6%).

Ovarian and cervical cancer mortality rates declining over time; uterine cancer mortality rates on the rise in recent years

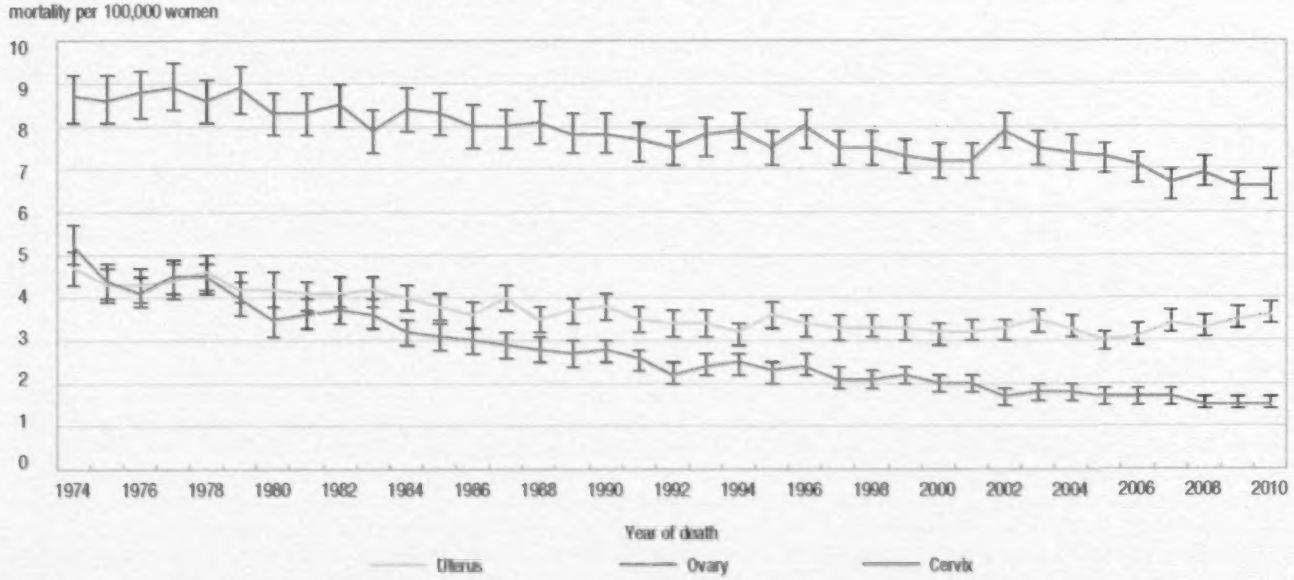
While incidence figures represent the number of new cases of a disease, mortality data reflect the number of deaths from that disease. Cancer was the leading cause of death for women in 2010,[12] and reproductive cancers accounted for 9.2% of these deaths.

Although uterine cancer was the most commonly diagnosed reproductive cancer, ovarian cancer caused the greatest number of deaths. In 2010, the mortality rate from ovarian cancer was 9.5 deaths per 100,000 women (Table 2). Despite the relatively high mortality rate, the risk of death due to ovarian cancer has decreased over time. Between 1974 and 2010, the rate decreased by 0.7% annually (Chart 3).[1]

Ovarian cancer mortality was higher than mortality from other reproductive cancers largely because most women are not diagnosed with ovarian cancer until it is at an advanced stage and the cancer has already spread beyond the ovaries. This is mainly because ovarian cancer lacks clearly identifiable early symptoms.[13,14]

The mortality rate for uterine cancer was 5.4 deaths per 100,000 women, making it the second deadliest form of reproductive cancer (Table 2). While uterine cancer mortality saw declines of 1.4% per year between 1974 and 2000, these declines came to an end between 2000 and 2010, when the rate increased by 0.9% annually (Chart 3).

Chart 3
Mortality rate, by type of cancer and year, age-standardized, Canada, 1974 to 2010



Note: The vertical error bars overlaid on the trend lines indicate the 95% confidence intervals. Confidence intervals indicate the degree of variability in the estimate and enable more valid comparisons of differences between estimates.
Source: Vital Statistics – Death Database, Statistics Canada.

Cervical cancer deaths were the lowest of the three main reproductive cancers with a rate of 2.2 deaths per 100,000 women (Table 2). Not only has mortality from cervical cancer been relatively low but the rate has also been declining over time. Mortality in 2010 was less than a third of what it was in 1974, a decline of 3.2% annually (Chart 3). The decline in deaths from cervical cancer, like the decline in new cases, is likely a result of cervical cancer screening programs.[6,7]

Mortality from ovarian and uterine cancers tends to increase with age; cervical cancer mortality more evenly distributed across age groups

A woman's risk of death from reproductive cancer, like her risk of diagnosis, is affected by her age. Death from ovarian cancer increased steadily with age, with women 85 and older having the highest mortality at a rate of 58.7 deaths per 100,000 women (Chart 4). This is similar to the pattern seen with new cases of ovarian cancer, which also tended to increase with age (Chart 2).

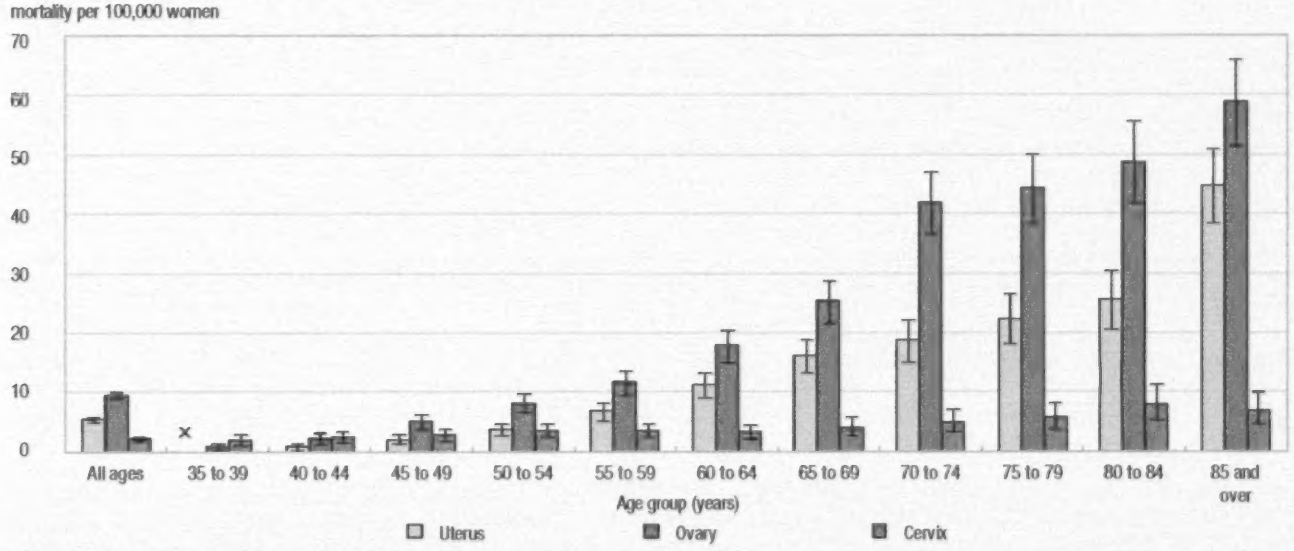
Similarly, deaths from uterine cancer also increased with age, peaking in the oldest age group. Women aged 85 and older had a uterine cancer mortality rate of 44.6 deaths per 100,000 women (Chart 4). By comparison, diagnosis with uterine cancer peaked among women in their early sixties.

Deaths from cervical cancer were more evenly distributed across the life span than ovarian or uterine cancer deaths, however there was still a general trend of increasing mortality with increasing age (Chart 4). The highest mortality was in women aged 80 to 84 years (7.9 per 100,000 women), followed by women aged 85 and older (6.9 per 100,000 women).[15] Like uterine cancer, cervical cancer mortality peaked at a later age than diagnosis, which was highest among women in their early forties.

Even though cervical cancer had a relatively low mortality rate, it presented a greater risk of death for younger women than ovarian or uterine cancer. In women under 45 years of age, the risk of death from cervical cancer was greater than death from either of the other two cancers (Chart 4).

Like the median age at diagnosis, the median age of death was the same for women with uterine and ovarian cancer, and was significantly younger for women with cervical cancer (Table 2). In addition, while the median age of death from uterine and ovarian cancer has risen over time, the median age has decreased for cervical cancer. The median age of death from cervical cancer in 2010 was 59 years, a decrease of one and a half years since 1974. In comparison, over the same period, the median age at death from ovarian cancer increased by nine and a half years and by three and a half years for uterine cancer. The decline in the median age at death from cervical cancer occurred because the greatest declines in mortality have been made in older women. For example, there was a 76.6% decrease in the rate of death from cervical cancer in women aged 70 to 74 compared with a 32.0% decrease in women aged 35 to 39.

Chart 4
Age-specific mortality rate, by type of cancer and age group, Canada, 2010



x suppressed to meet the confidentiality requirements of the *Statistics Act*

Note: Deaths in younger age groups have been suppressed due to the small number of cases (n<5).
The vertical error bars overlaid on the bars indicate the 95% confidence intervals. Confidence intervals indicate the degree of variability in the estimate and enable more valid comparisons of differences between estimates.

Source: Vital Statistics - Death Database, Statistics Canada.

Summary

Cancers of the reproductive system accounted for 12.0% of all newly diagnosed cancer cases in Canadian women in 2010. Uterine cancer was the most commonly diagnosed with 30.3 new cases per 100,000 women, its highest rate since 1992. While the risk of death from ovarian cancer was almost twice that of uterine cancer, ovarian cancer mortality has been steadily decreasing since 1974. On the other hand, the rate of death from uterine cancer increased between 2000 and 2010. Cervical cancer had the fewest new cases and deaths, but was also the most likely to affect younger women, with the lowest median age of diagnosis and death.

Tanya Navaneelan is an analyst with the Health Statistics Division.

The author wishes to acknowledge Gregory Christ, Larry Ellison and Dianne Zakaria for their contributions.

What you need to know about this study

Classification of key concepts

For incidence data, the cancers discussed in this article were defined using the International Classification of Disease for Oncology, Third Edition (ICD-O-3)[16] as follows: Uterus: C54.0 - C54.9, C55.9; Ovary: C56.9; Cervix: C53.0 - C53.9. All cancers exclude the following histologies: 9050-9055, 9140 and 9590-9992. Only malignant cases were included.

Mortality data were classified according to the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10),[17] Ninth Revision (ICD-9),[18] and Eighth Revision (ICD-8).[19] The following definitions were used to determine cause of death:

Cancer of the uterus: ICD-10 - C54, C55; ICD-9 - 182, 179; ICD-8 - 182

Cancer of the ovaries: ICD-10 - C56; ICD-9 -183; ICD-8 - 183

Cancer of the cervix: ICD-10 - C53; ICD-9 - 180; ICD-8 - 180

Data sources

Cancer incidence data are from the Canadian Cancer Registry (CCR), a dynamic person-oriented, population-based database maintained by Statistics Canada. The CCR contains information on cases diagnosed from 1992 onward, compiled from reports from every provincial/territorial cancer registry.

Analyses were carried out using a tabulation master file. This master file was created by applying the International Rules for Multiple Primary Cancers[20] to a copy of the CCR (dated January 10, 2014) limited to invasive tumours and in situ bladder tumours.

Mortality data are from the Canadian Vital Statistics – Death Database, also maintained by Statistics Canada. Mortality data are based on information provided by the provincial and territorial vital statistics registrars. Canadians who died while residing outside of Canada were excluded from the analysis because of inconsistencies in the reporting of deaths by non-Canadian jurisdictions.

Supplementary data on screening are from the Canadian Community Health Survey (CCHS).[7]

Trend analysis

Trends in age-standardized incidence and mortality rates over time were determined using the Joinpoint Regression Program (v.4.0.4) distributed by the SEER (Surveillance Epidemiology and End Results) program.[21]

All trend analyses were performed using age-standardized rates. Since cancer is more likely to occur in older people, the age structure of a population will have a strong influence on the incidence and mortality rates observed. To allow for more valid comparisons over time, age-standardized rates are used to control for differences in population age-structure. The age-standardized rate is the rate that would occur if the population of interest had the same age-structure as the standard population. The standard population used here is the July 1, 1991 Canadian population.

Limitations

Incidence data may exclude some cases that were reported late or not processed in time for the final file. As the CCR is a dynamic database previous years of data are updated with these missing cases. Therefore, the most recent years of data may slightly underestimate the actual incidence.

Some women in the population may not be at risk for certain reproductive system cancers if the organs where these cancers form have been removed (e.g. hysterectomy). These women were not removed from the at-risk population in this analysis.

New revisions of the ICD are developed periodically to maintain the classification's currency. The mortality data reported in this article use three revisions of the ICD coding system. Different revisions may classify certain causes of deaths differently, resulting in the classification of deaths being affected by the year in which they occurred. While differences between the revisions used in this article are minimal for cancers of the reproductive system, discrepancies based on the ICD version used are possible.[22,23,24]

References and notes

1. All trend analyses were performed using age-standardized incidence and mortality rates. Rates were standardized to the 1991 Canadian population.
2. The annual changes in incidence and mortality rates reported in this article are the annual percent change (APC). The calculation involves fitting a straight line to the natural logarithm of the data when it is displayed by calendar year. The significance level was set at $p < 0.05$.
3. Saraiya, Mona, Marc Steben, Meg Watson and Lauri Markowitz. 2013. "Evolution of cervical cancer screening and prevention in United States and Canada: implications for public health practitioners and clinicians." *Preventive Medicine*. Vol. 57, no. 5, 426-433.
4. Peirson, Leslea, Donna Fitzpatrick-Lewis, Donna Ciliska and Rachel Warren. 2013. "Screening for cervical cancer: a systematic review and meta-analysis." *Systematic Reviews*. Vol. 2, no. 35, 14-35.
5. Duarte-Franco, Eliane and Eduardo L. Franco. 2004. "Cancer of the uterine cervix." *BMC Women's Health*. Vol. 4, no. Suppl 1, S1-13.
6. Franco, Eduardo L., Eliane Duarte-Franco and Alex Ferenczy. 2001. "Cervical cancer: epidemiology, prevention and the role of human papillomavirus in infection." *Canadian Medical Association Journal*. Vol. 164, no. 4, 1017-1025.
7. Statistics Canada. Canadian Community Health Survey, 2012. For more information: www23.statcan.gc.ca:81/imdb/p2SV.pl?Function=getSurvey&SDDS=3226&lang=en&db=imdb&adm=8&dis=2.
8. Median refers to the midpoint of a distribution of numbers sorted by size.
9. Sasieni, P.D., J. Shelton, N. Ormiston-Smith, C.S. Thomson and P.B. Silcocks. 2011. "What is the lifetime risk of developing cancer?: the effect of adjusting for multiple primaries." *British Journal of Cancer*. Vol. 105, no. 3, 460-465.
10. Lifetime risk was calculated using the AMP (adjusted for multiple primaries) method. This method corrects for the inclusion of multiple primaries in the incidence data and prevents overestimating the risk of developing cancer.
11. Since lifetime risk is based on current incidence and mortality rates, it is calculated on the assumption that the current rates – at all ages – will remain constant during the life of the newborn child. While lifetime risk is a useful summary of risk in the population, a wide range of lifestyle and genetic factors can affect the risk of cancer and the risk for every individual is different.
12. Statistics Canada. 2014. CANSIM Table 102-0561 – Leading causes of death, total population, by age group and sex, Canada, annual.
13. Permuth-Wey, Jennifer and Thomas A. Sellers. 2009. "Epidemiology of ovarian cancer." *Methods in Molecular Biology*. Vol. 472, no. 4, 413-437.
14. Gubbels, Jennifer A.A., Nick Claussen, Arvinder A. Kapur, Joseph P. Connor and Manish S. Patankar. 2010. "The detection, treatment, and biology of epithelial ovarian cancer." *Journal of Ovarian Research*. Vol. 3, no. 8, 1-11.
15. Given the relatively small number of cervical cancer deaths in each age group, differences in mortality by age group should be interpreted with caution, although previous years of data confirm the 2010 finding.
16. World Health Organization. 2000. "ICD-O: International Classification of Diseases for Oncology." Third ed. Geneva: World Health Organization.
17. World Health Organization. 1992. "ICD-10: International Statistical Classification of Diseases and Related Health Problems." Vol 1. Geneva: World Health Organization.
18. World Health Organization. 1975. "Manual of the International Statistical Classification of Diseases, Injuries and Causes of Death, Ninth Revision." Vol 1. Geneva: World Health Organization.
19. World Health Organization. "Eighth Revision International Classification of Diseases, Adapted for Use in the United States." Vol 1. Washington, D.C.: U.S. Department of Health, Education and Welfare.
20. International Agency for Research on Cancer, World Health Organization, International Association of Cancer Registries, European Network of Cancer Registries. 2004. "International Rules for Multiple Primary Cancers, ICD-O Third Edition, Internal Report No. 2004/02." Lyon: International Agency for Research on Cancer.
21. Joinpoint Regression Program. Version 4.0.4 - May 2013. Statistical Methodology and Applications Branch, Surveillance Research Program, National Cancer Institute.
22. Statistics Canada. 2005. "Comparability of ICD-10 and ICD-9 for mortality statistics in Canada." Statistics Canada catalogue no. 84-548-XIE.
23. Anderson, Robert N., Arialdi M. Miniño, Donna L. Hoyert and Harry M. Rosenberg. 2001. "Comparability of cause of death between ICD-9 and ICD-10: Preliminary estimates." *National Vital Statistics Reports*. Vol. 49, no. 2.
24. National Center for Health Statistics. 1980. "Estimates of selected comparability ratios based on dual coding of 1976 death certificates by the Eighth and Ninth Revisions of the International Classification of Diseases." *Monthly Vital Statistics Report*. Vol. 28, no. 11.